

Computer Organization

[Introduction to **VIVADO**]

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March 16th, 2017

1. Go to Xilinx Website

Use below link:

<https://www.xilinx.com/support/downloads.html>

The screenshot shows the Xilinx website's Downloads page. The header includes the Xilinx logo and navigation links: APPLICATIONS, PRODUCTS, DEVELOPER ZONE, SUPPORT, and ABOUT. The breadcrumb trail is: Xilinx - All Programmable > Support > Downloads. The main heading is "Downloads". Below it are three tabs: "Installation Overview Video", "Doc Navigator Video (5:28)", and "Licensing Help". A secondary navigation bar includes: Vivado, Embedded Development, SDx Development Environments, ISE, Device Models, and CAE Vendor Libraries. The left sidebar lists versions from 2016.4 down to 2012.2, with 2016.4 selected. The main content area is titled "Vivado Design Suite - HLx Editions - 2016.4 Full Product Installation". It contains "Important Information" about the Vivado Web Installer, including instructions on how to use it, download options, and a note about the 6GB download size. It also lists the components included in the download: Vivado HL WebPACK (License free), Vivado HL Design Edition, Vivado HL System Edition, and Documentation Navigator (Standalone). A footer note states that physical shipment of DVDs is no longer available for ordering.

download.html

XILINX
ALL PROGRAMMABLE.

APPLICATIONS PRODUCTS DEVELOPER ZONE SUPPORT ABOUT

Xilinx - All Programmable > Support > Downloads

Downloads

Installation Overview Video Doc Navigator Video (5:28) Licensing Help

Vivado Embedded Development SDx Development Environments ISE Device Models CAE Vendor Libraries

2016.4
2016.3
2016.2
2016.1
2015.4
2015.3
2015.2
2015.1
2014.4
2014.3
2014.2
2014.1
2013.4
2013.3
2013.2
2013.1
2012.4
2012.3
2012.2

Vivado Design Suite - HLx Editions - 2016.4 Full Product Installation

Important Information

Vivado Web Installer

Use Vivado Web Installer to Download Only (Install Separately) or Download & Install

Download Only (Install Separately): Web Installer supports the feature to download full image containing all devices and tool options without running installation. Use this option to install full image on network drive or to allow different users maximum flexibility when installing.

The Web Installer will accept your login credentials and allow you to select the directory and OS to download full image.

Download and Install: Web Installer also allows you to download only what you need! Use this option to select and install your desired edition of Vivado Design Suite:

- Vivado HL WebPACK(License free)
- Vivado HL Design Edition
- Vivado HL System Edition
- Documentation Navigator (Standalone)

The Web Installer will accept your login credentials and allow you to select the edition, device families and tool components (SDK or DocNav). It will then automatically download only your selection and install it on your local machine.

Note: Use the Web Installers to install Vivado HL WebPACK and cut your download time by up to 2/3 and download size by up to 6GB!

For more information, please watch the [Installation Overview Video](#).

Please be aware that with the release of version 2016.2, DVDs and any other forms of downloadable physical shipment will no longer be available for ordering and will only be available for download at Xilinx.com.

Download Includes

Vivado Design Suite HLx Editions (All Editions)

Full Product Installation

Jan 25, 2017

2016.x - Vivado Known Issues

2016.4 - Release Notes

License Solution Center

2. Download Vivado HLx 2016.4: **WebPACK** and Editions

to 6GB!

For more information, please watch the [Installation Overview Video](#).

Please be aware that with the release of version 2016.2, DVDs and any other forms of downloadable physical shipment will no longer be available for ordering and will only be available for download at Xilinx.com.

Vivado HLx 2016.4: WebPACK and Editions - Windows Self Extracting Web Installer

↓ Vivado HLx 2016.4: WebPACK and Editions - Windows Self Extracting Web Installer (EXE - 50.44 MB)
MD5 SUM Value: 68c988206d6d17af24f2a1137a452fff

↓ Vivado HLx 2016.4: WebPACK and Editions - Linux Self Extracting Web Installer (BIN - 80.67 MB)
MD5 SUM Value: a70505f62ad81db88ab636def9951628

↓ Vivado HLx 2016.4: All OS installer Single-File Download (TAR/GZIP - 20.59 GB)
MD5 SUM Value: ffe1026646632f1a6bd1ce0d4d2e52d6

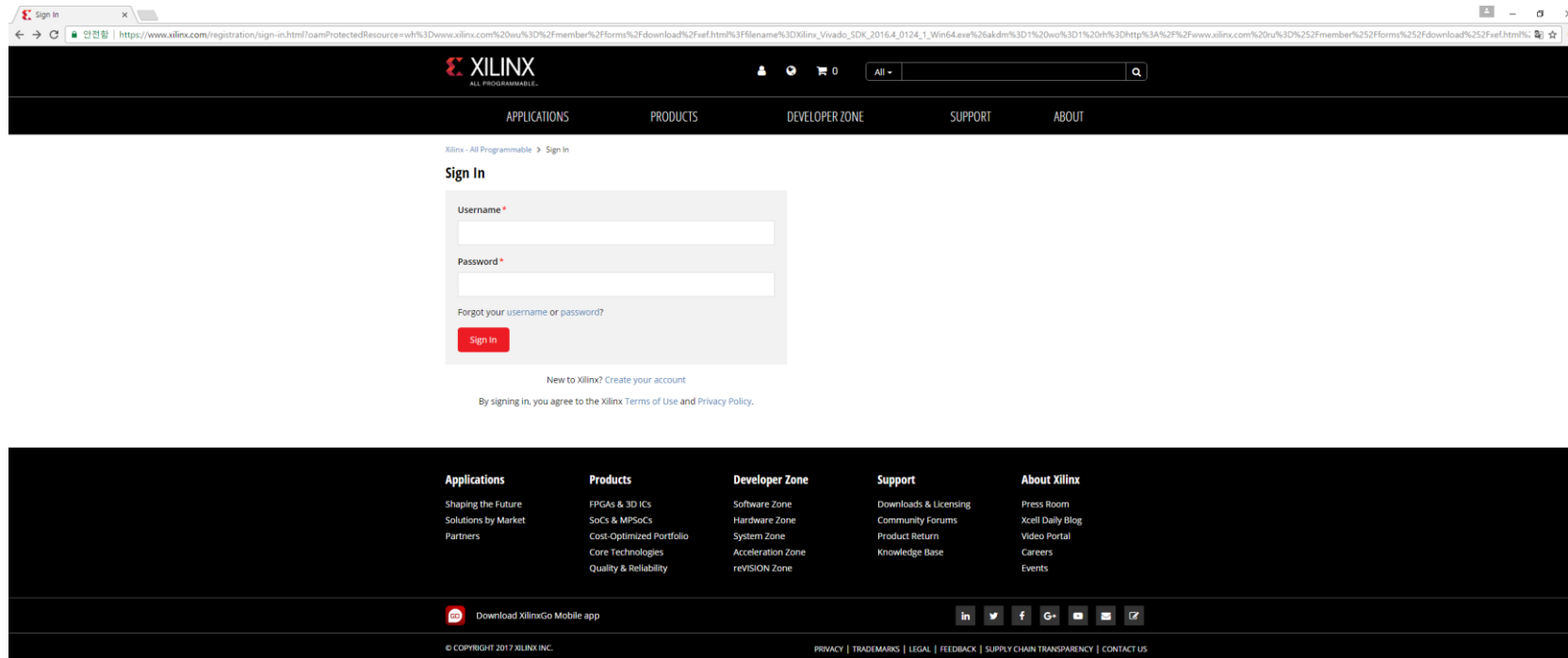
⚠ Important Information

Having trouble downloading?

The download links above require the installation and use of a browser-based (plug-in) download manager. Your company's policy and/or firewall settings may not permit the download manager to be installed or operate properly. If you wish to bypass the use of the Xilinx download manager, please

In this guide, we assume you are using Microsoft Windows 10. You may want to use other distributions (e.g., linux), but we recommend to use Windows, because we will use Windows 10 for grading.

2-1. Sign in the Xilinx account. If you don't have the account, the you should create your account.



The screenshot shows the Xilinx website's sign-in page. The browser address bar displays a long URL. The Xilinx logo and navigation menu are at the top. The main content area features a 'Sign In' form with fields for 'Username' and 'Password', a 'Forgot your username or password?' link, and a red 'Sign In' button. Below the form, there is a link for new users to 'Create your account' and a disclaimer about agreeing to terms and privacy policy. The footer contains links for Applications, Products, Developer Zone, Support, and About Xilinx, along with social media icons and copyright information.

Sign In

Username *

Password *

Forgot your username or password?

Sign In

New to Xilinx? [Create your account](#)

By signing in, you agree to the [Xilinx Terms of Use](#) and [Privacy Policy](#).

Applications
Shaping the Future
Solutions by Market
Partners

Products
FPGAs & 3D ICs
SoCs & MPSoCs
Cost-Optimized Portfolio
Core Technologies
Quality & Reliability

Developer Zone
Software Zone
Hardware Zone
System Zone
Acceleration Zone
reVISION Zone

Support
Downloads & Licensing
Community Forums
Product Return
Knowledge Base

About Xilinx
Press Room
Xcell Daily Blog
Video Portal
Careers
Events

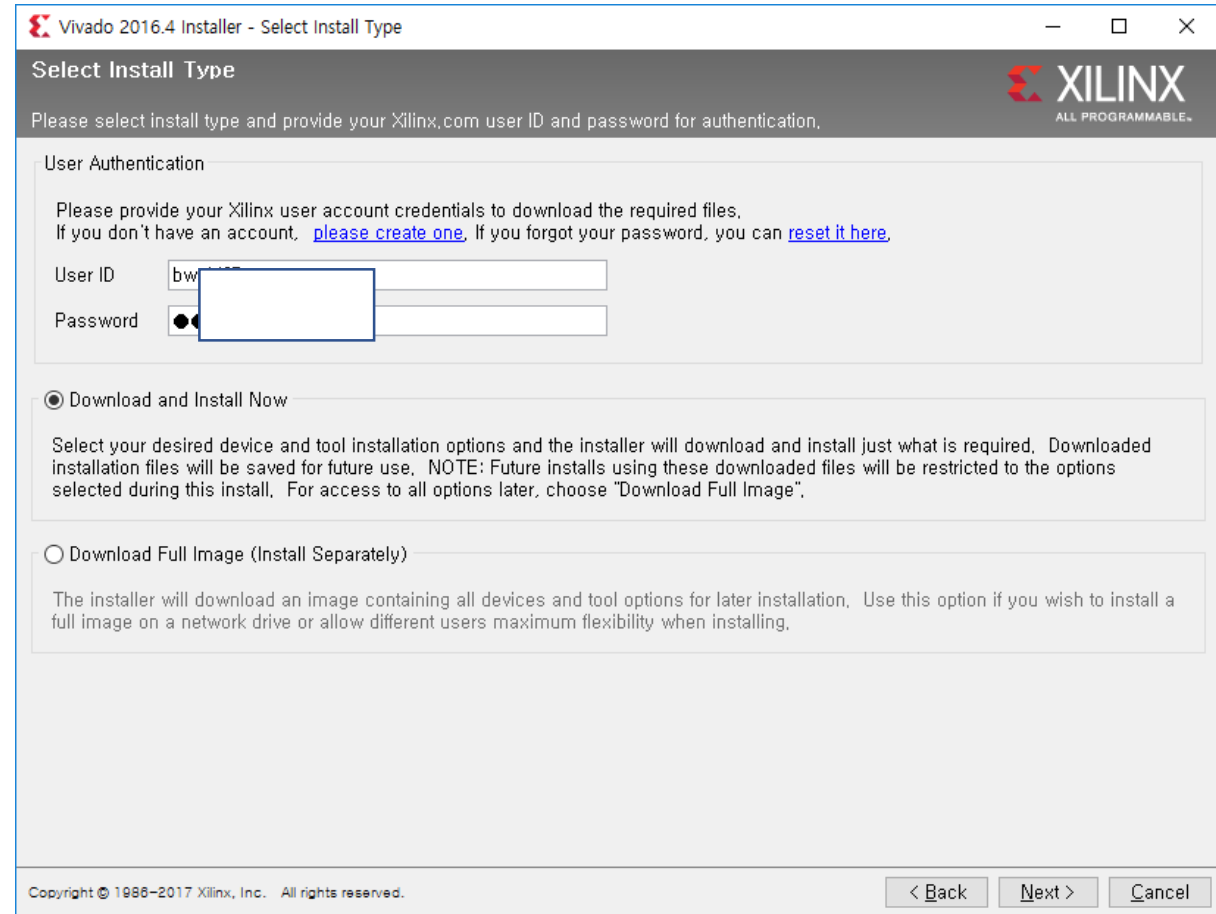
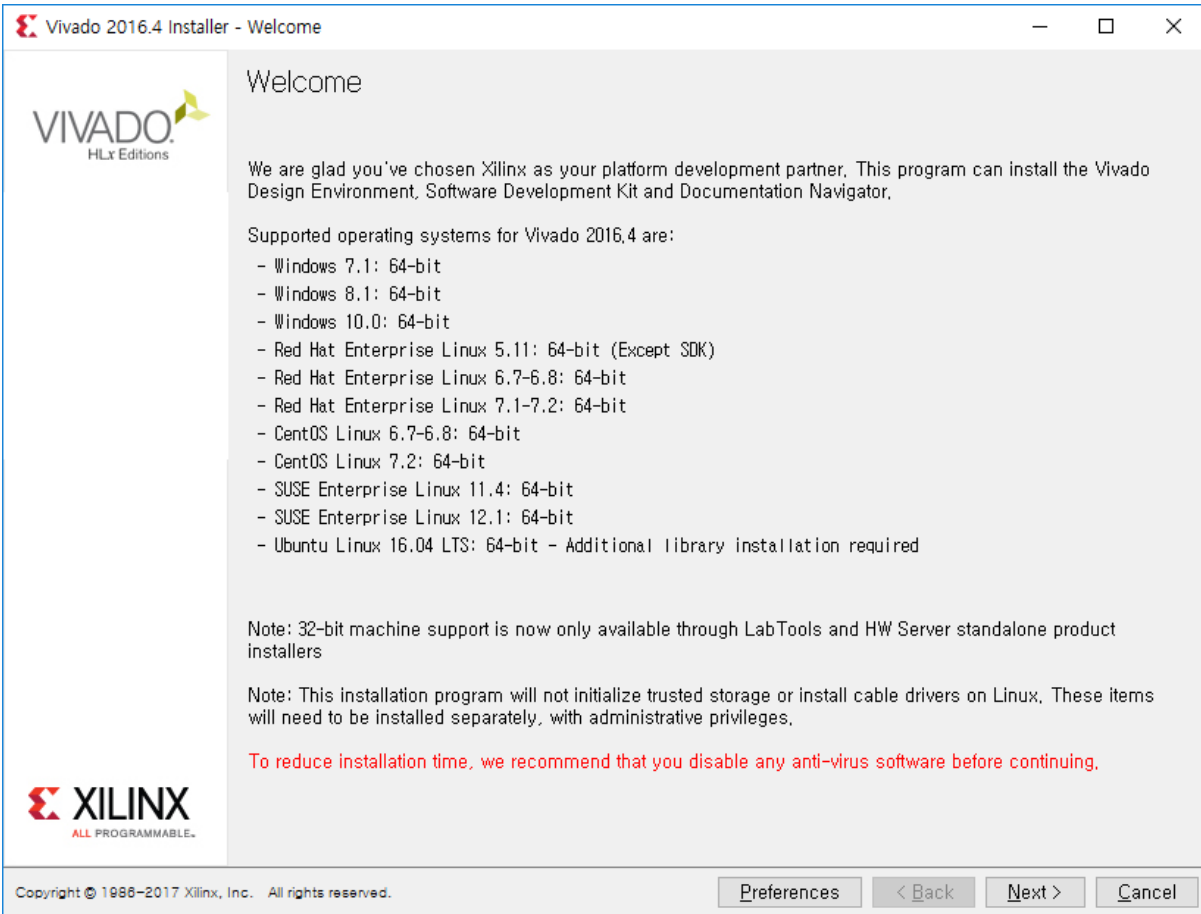
Download XilinxGo Mobile app

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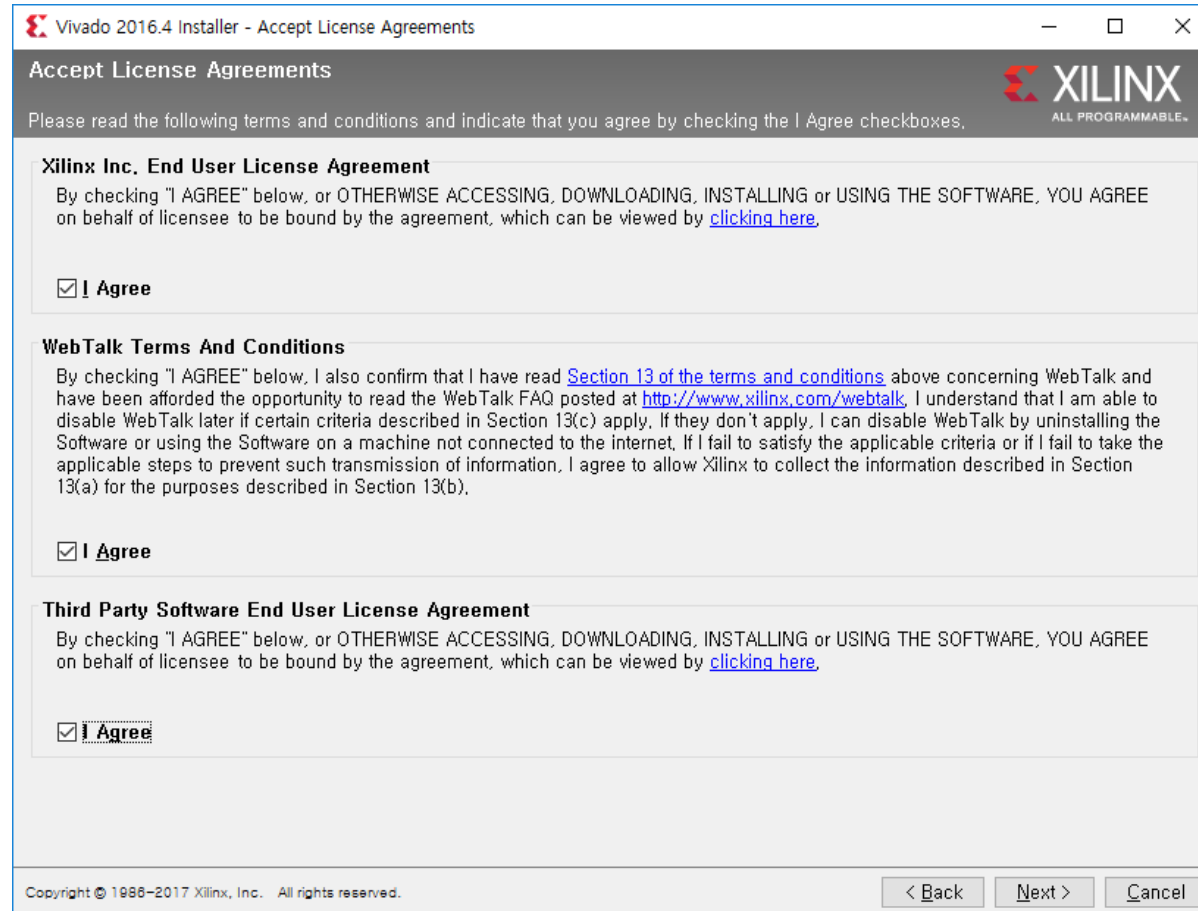
3. Execute Xilinx setup file



4. 5. Press Next



6. Check three "I Agree"s, and press next



Vivado 2016.4 Installer - Accept License Agreements

Accept License Agreements

Please read the following terms and conditions and indicate that you agree by checking the I Agree checkboxes.

Xilinx Inc. End User License Agreement

By checking "I AGREE" below, or OTHERWISE ACCESSING, DOWNLOADING, INSTALLING or USING THE SOFTWARE, YOU AGREE on behalf of licensee to be bound by the agreement, which can be viewed by [clicking here](#).

☒ I Agree

WebTalk Terms And Conditions

By checking "I AGREE" below, I also confirm that I have read [Section 13 of the terms and conditions](#) above concerning WebTalk and have been afforded the opportunity to read the WebTalk FAQ posted at <http://www.xilinx.com/webtalk>. I understand that I am able to disable WebTalk later if certain criteria described in Section 13(c) apply. If they don't apply, I can disable WebTalk by uninstalling the Software or using the Software on a machine not connected to the internet. If I fail to satisfy the applicable criteria or if I fail to take the applicable steps to prevent such transmission of information, I agree to allow Xilinx to collect the information described in Section 13(a) for the purposes described in Section 13(b).

☒ I Agree

Third Party Software End User License Agreement

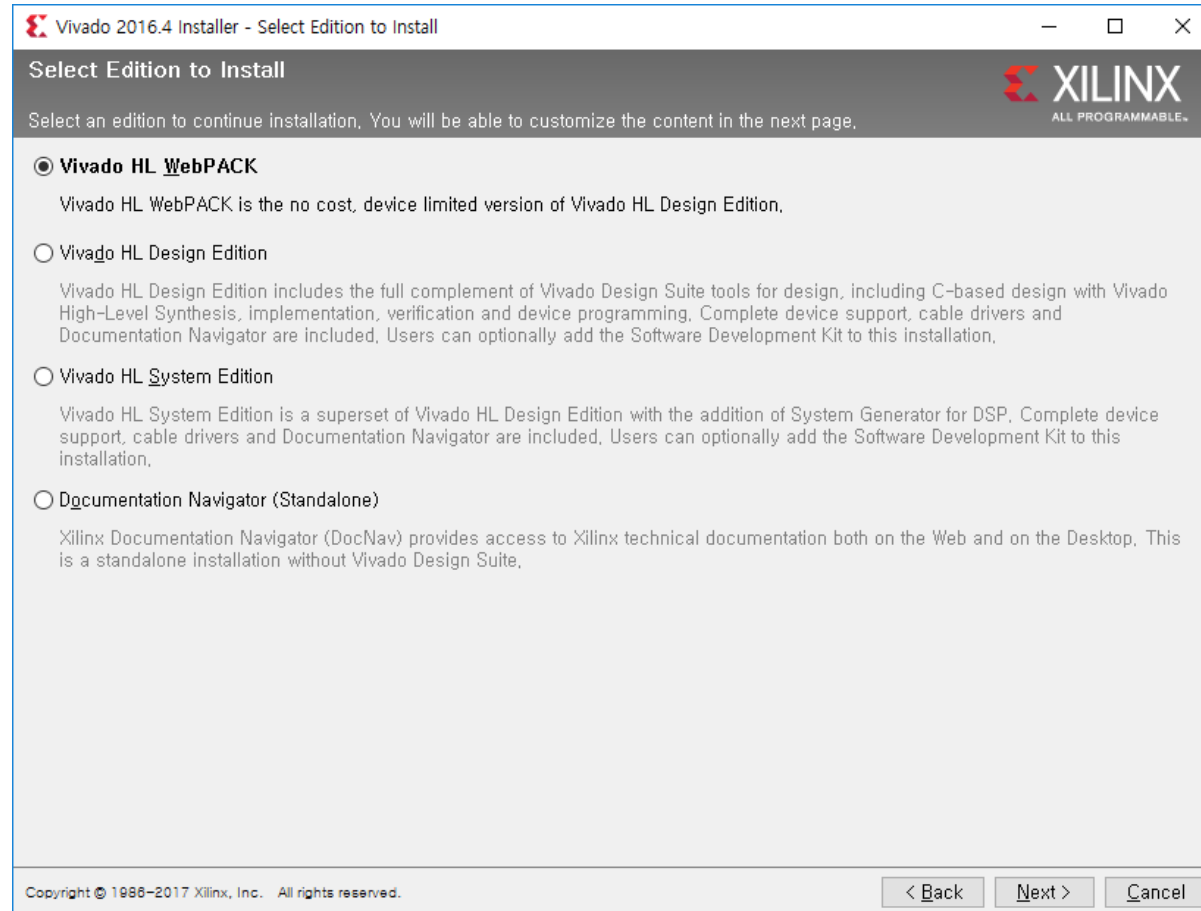
By checking "I AGREE" below, or OTHERWISE ACCESSING, DOWNLOADING, INSTALLING or USING THE SOFTWARE, YOU AGREE on behalf of licensee to be bound by the agreement, which can be viewed by [clicking here](#).

☒ I Agree

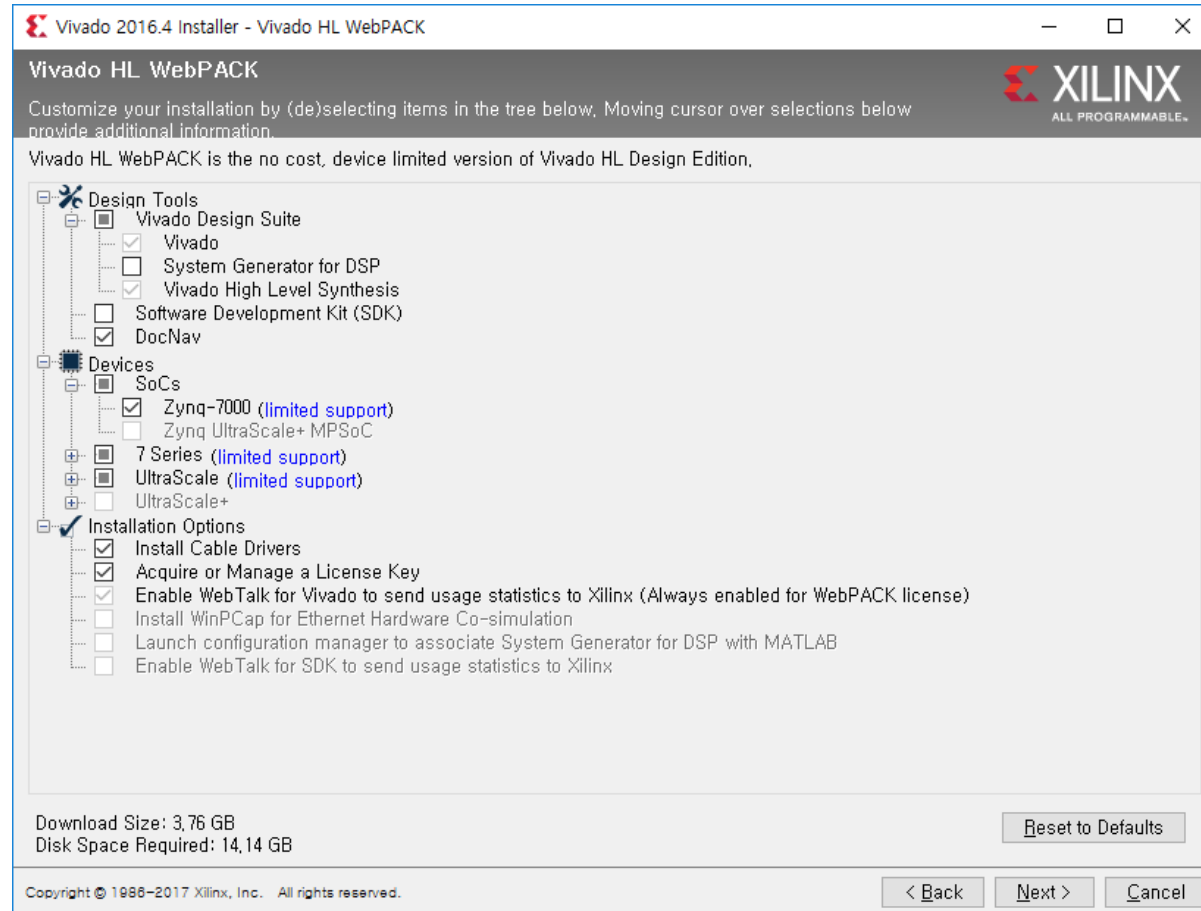
Copyright © 1986–2017 Xilinx, Inc. All rights reserved.

< Back Next > Cancel

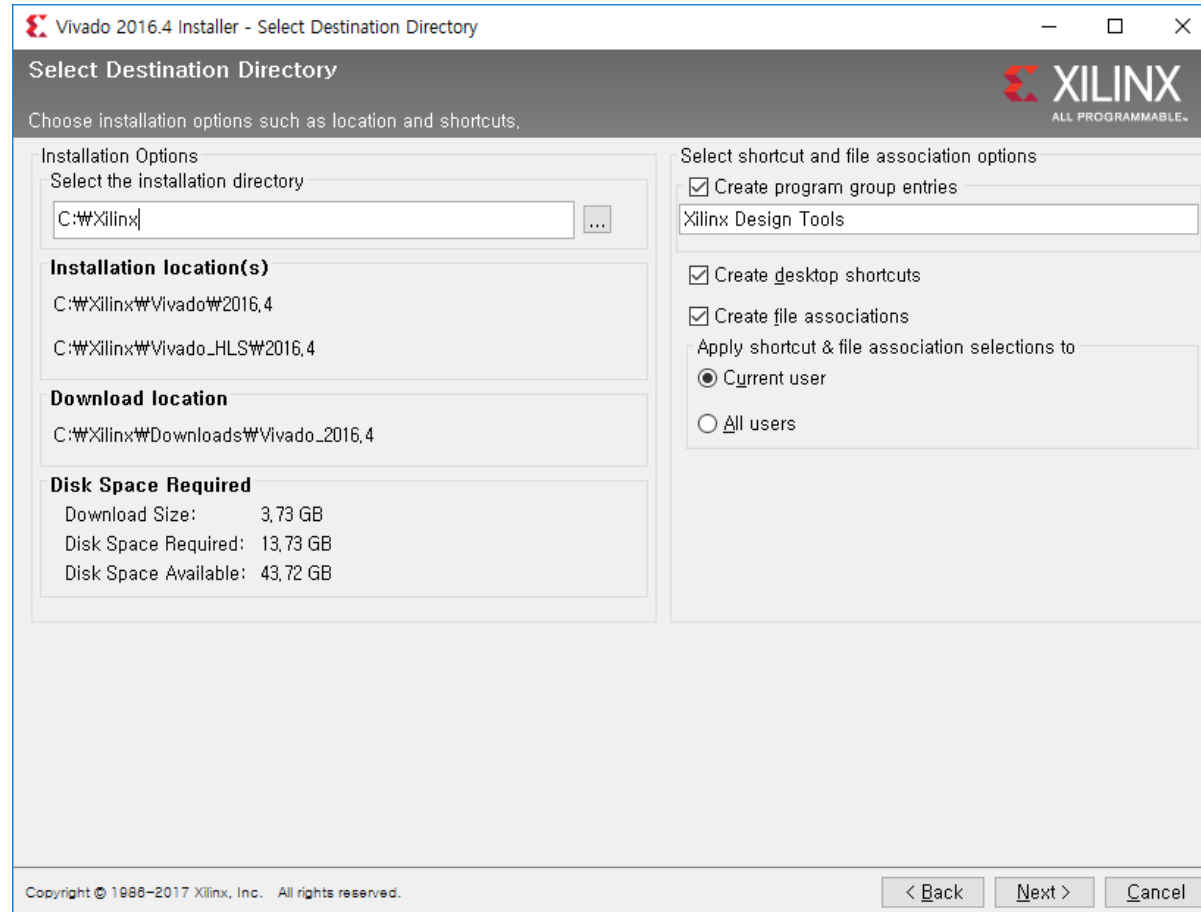
7. Choose WebPack Edition (It's free!!)



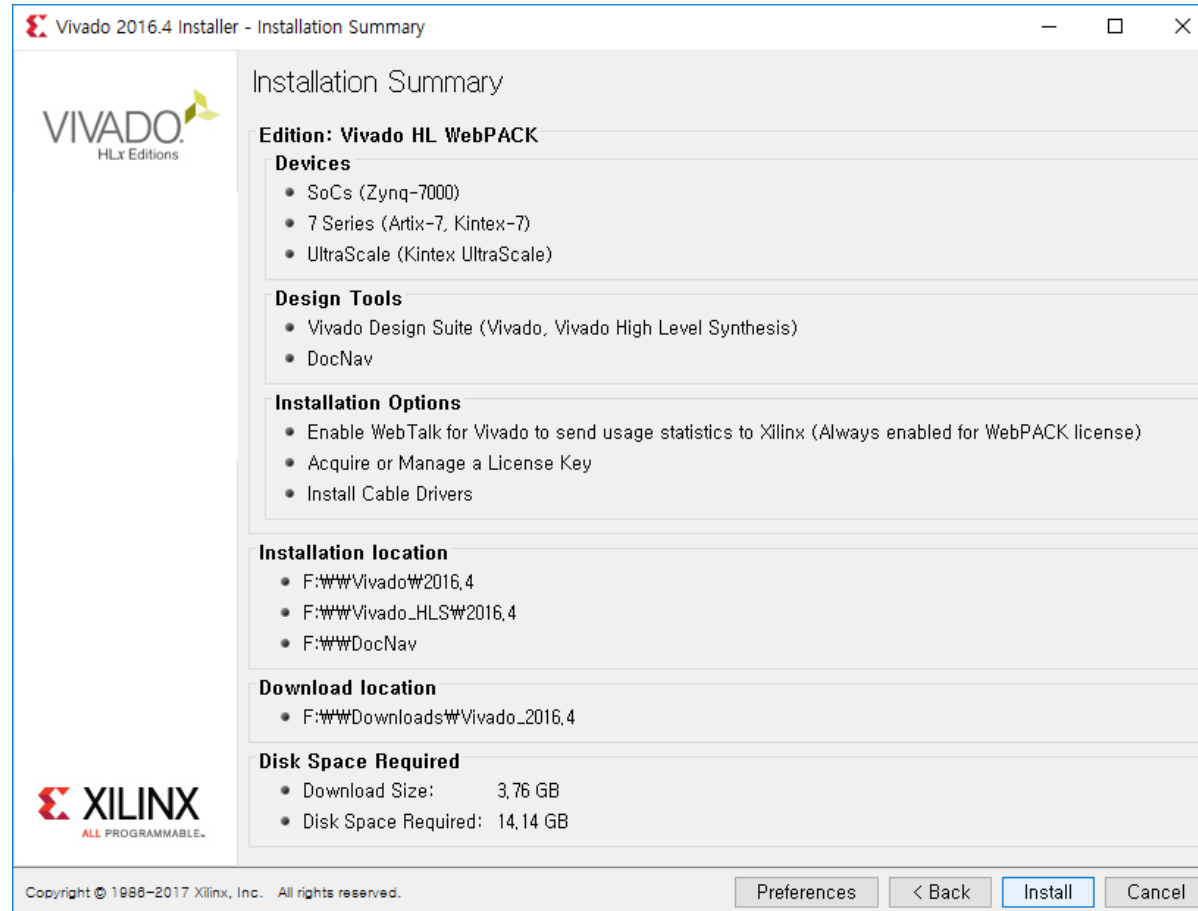
8. Press next



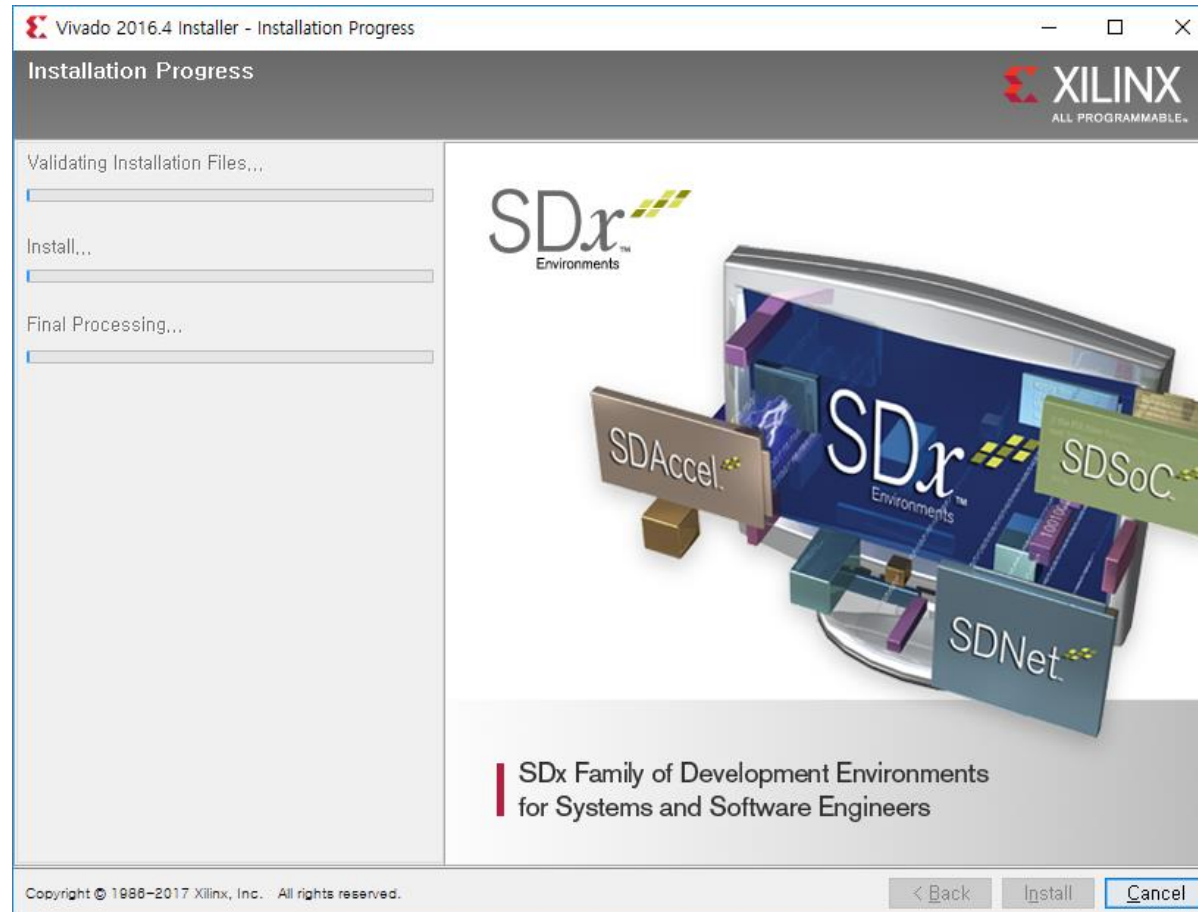
9. Press next



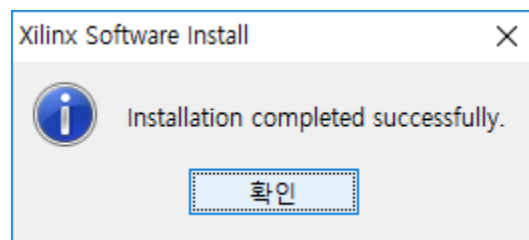
10. Press "Install"



11. Wait until installing is finished.



12. Finish!



13. License Manager:
Check "Get Free ISE WebPack ISE/Vivado or PetaLinux License",
and click "Connect Now".



You may open
License Manager manually

14. Create a Vivado WebPACK license.

The screenshot shows the Xilinx Product Licensing page. The 'Create New License File' section is active, displaying a table of available licenses. The table has columns for Product, Type, License, Available Seats, Status, and Subscription End Date. The 'Vivado Design Suite: HL WebPACK 2015 and Earlier License' is selected. Below the table, there is a 'Generate Node-Locked License' button. The 'Activation Based Licenses' section is also visible, showing a table of licenses with columns for Product, Type, License, Available Seats, Status, and Subscription End Date. The 'Vivado Design Suite: HL WebPACK 2015 and Earlier License' is selected in this table as well. The 'Important Information' section is also visible, providing details about the activation licensing process.

Product	Type	License	Available Seats	Status	Subscription End Date
SDSoC Environment, 60 Day Evaluation License	Certificate - No Charge	Node	1/1	Current	None
Vivado Design Suite: HL WebPACK 2015 and Earlier License	Certificate - No Charge	Node	1/1	Current	None
Vivado Design Suite (No ISE) 30-Day Evaluation License	Certificate - Evaluation	Node	1/1	Current	30 days
ISE WebPACK License	Certificate - No Charge	Node	1/1	Current	None
Petalinux Tools License	Certificate - Evaluation	Node	1/1	Current	365 days

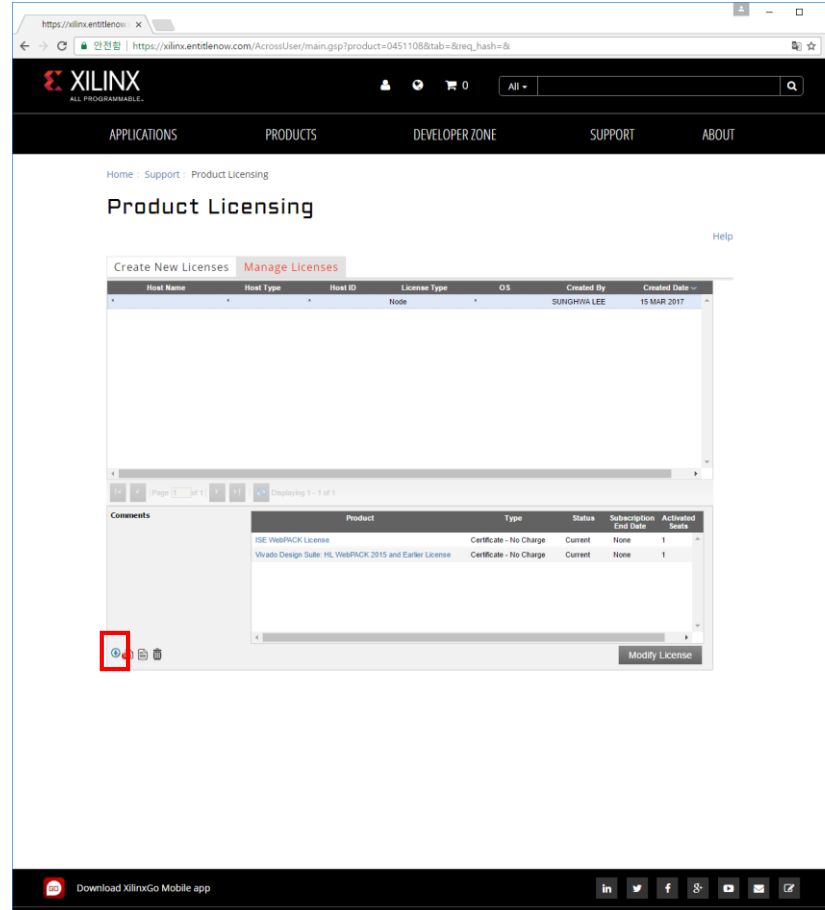
Product	Type	License	Available Seats	Status	Subscription End Date
Vivado Design Suite (No ISE) 30-Day Evaluation Client Activation License	Activation - Evaluation	Node	1/1	Current	30 days
Vivado HLS Evaluation License	Activation - Evaluation	Node	1/1	Current	30 days
Xilinx MicroBlaze/ARM Programmable SoC Software Development Kit - Standalone	Activation - No Charge	Node	1/1	Current	None

The screenshot shows the Xilinx Product Licensing page with the 'Generate Node License' dialog box open. The dialog box has three tabs: '1 PRODUCT SELECTION', '2 SYSTEM INFORMATION', and '3 COMMENTS'. The '1 PRODUCT SELECTION' tab is active, showing a table of product selections. The table has columns for Product, Type, License, Available Seats, Subscription End Date, Requested Seats, and Requested Seats. The 'Vivado Design Suite: HL WebPACK 2015 and Earlier License' is selected. The '2 SYSTEM INFORMATION' tab is also visible, showing a table of system information. The table has columns for License, Node, and Host ID. The 'Vivado Design Suite: HL WebPACK 2015 and Earlier License' is selected in this table as well. The '3 COMMENTS' tab is also visible, showing a text area for comments. The 'Generate Node License' button is at the bottom of the dialog box.

Product	Type	License	Available Seats	Subscription End Date	Requested Seats	Requested Seats
ISE WebPACK License	No Charge	1/1	None	1		
Vivado Design Suite: HL WebPACK 2015 and Earlier License	No Charge	1/1	None	1		

License	Node	Host ID
Vivado Design Suite: HL WebPACK 2015 and Earlier License	ANY	

15. Select licenses and Download it



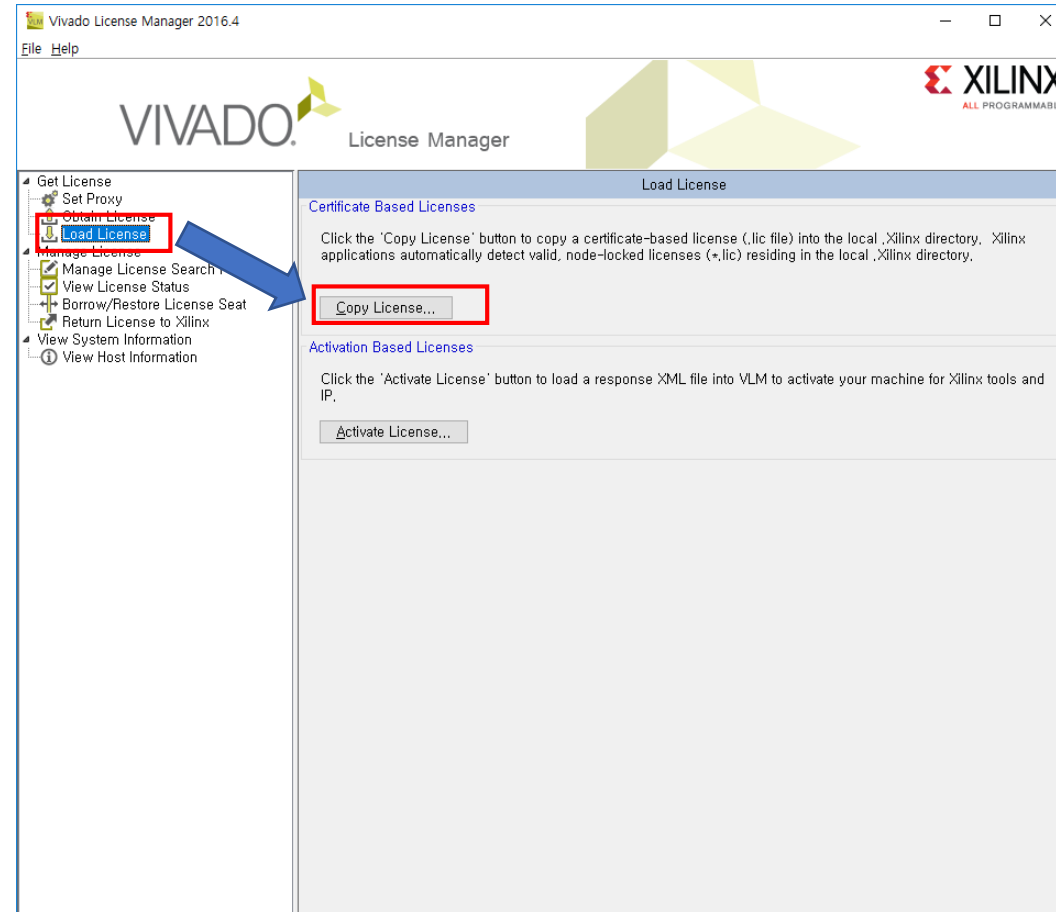
The screenshot shows the Xilinx Product Licensing web interface. The page title is "Product Licensing". There are two tabs: "Create New Licenses" and "Manage Licenses". The "Manage Licenses" tab is active, displaying a table of licenses. The table has columns: Host Name, Host Type, Host ID, License Type, OS, Created By, and Created Date. Below the table, there is a "Comments" section with a table of license details. The "Download" button is highlighted with a red box.

Host Name	Host Type	Host ID	License Type	OS	Created By	Created Date
			Node		SUNGHYUN LEE	15 MAR 2017

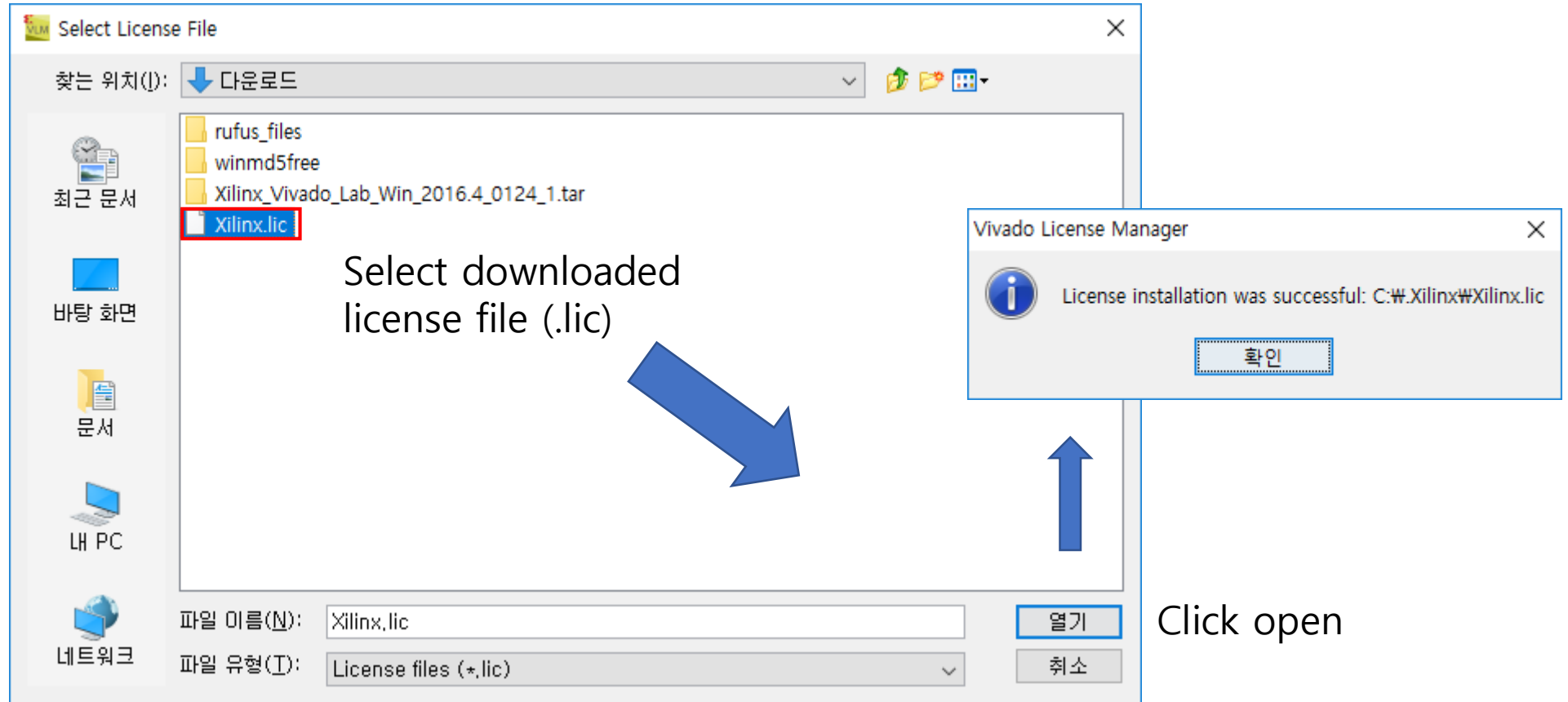
Product	Type	Status	Subscription Trial Date	Activated Nodes
ISE VeePack License	Certificate - No Charge	Current	None	1
Vivado Design Suite: HL VeePack 2015 and Earlier License	Certificate - No Charge	Current	None	1

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16. Load License



17. Copy License



18. Check License Status (FINISH)

Vivado License Manager 2016.4

File Help

VIVADO License Manager

XILINX ALL PROGRAMMABLE

Get License
Set Proxy
Obtain License
Load License
Manage License
Manage License Search Paths
View License Status
Borrow/Restore License Seat
Return License to Xilinx
View System Information
View Host Information

View License Status

Certificate Based Licenses: Filter: ☒ Hide Free Built-in Licenses

License Name	Tools/IP	Expiration Date	Version Limit	License Type	Location	#
Analyzer	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
ChipScopePro_SIO...	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
ChipscopePro	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
HLS	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
HLS	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
ISE_WebPACK	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
PlanAhead	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
SDK	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
SDK	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
V_WebPACK	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
WebPACK	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
XC7Z010	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U
XC7Z020	Tools	Permanent	2018.03	Nodelocked	C:\W_Xilinx\W_Xilinx,lic	U

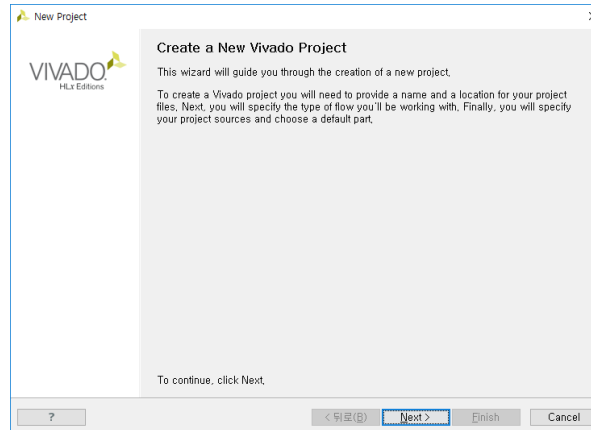
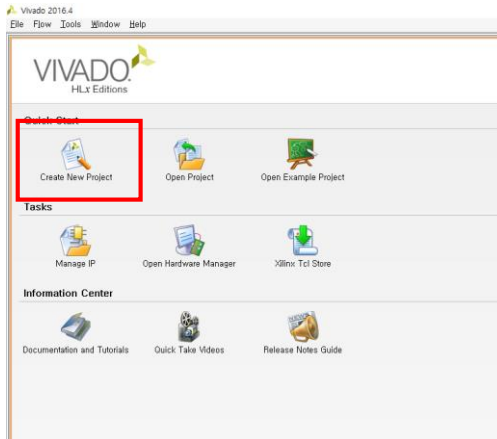
Activation Based Licenses:

License Name	Tools/IP	Expiration Date	Version Limit	Server/Client	Location	# of
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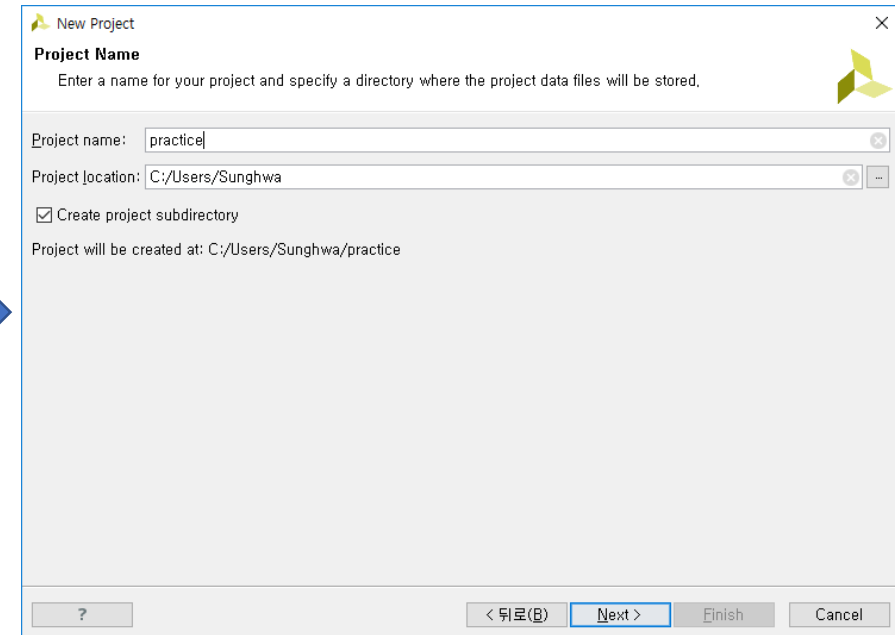
Clear Cache Refresh

How to make a project

1. Run Vivado and create a new project

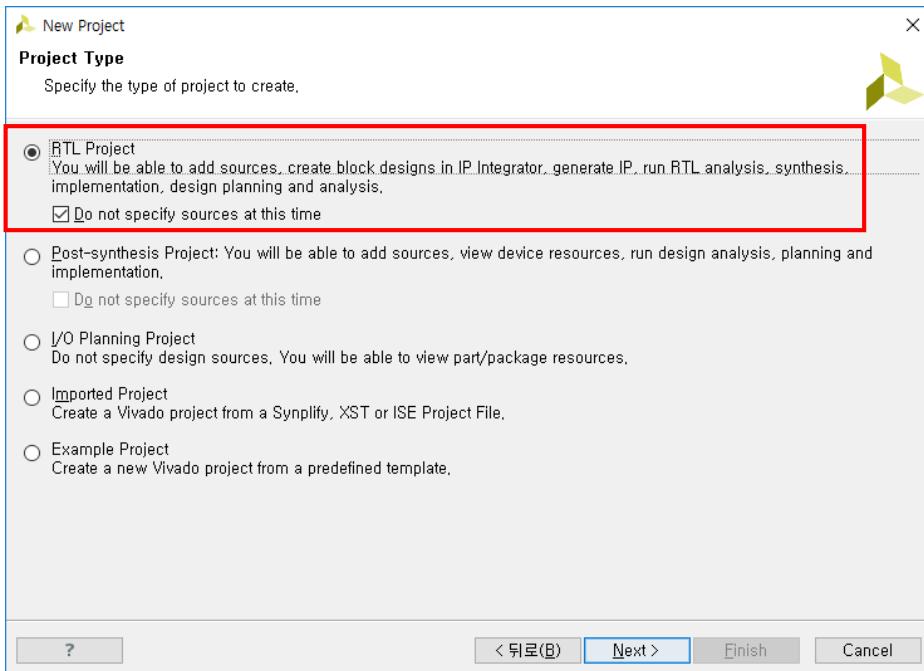


Click Next

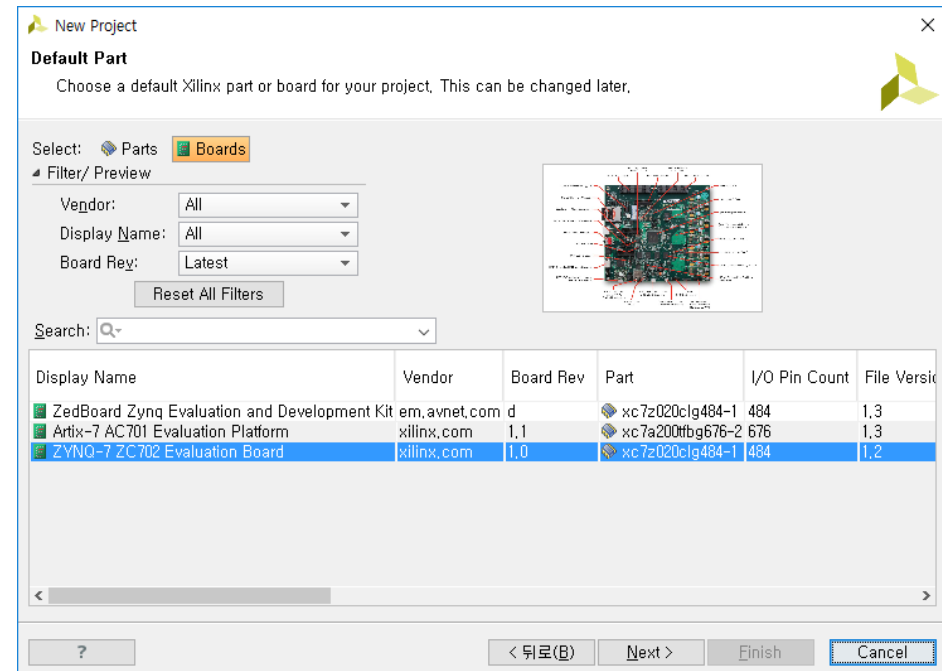
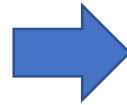


Enter a project name

2. Create a new project



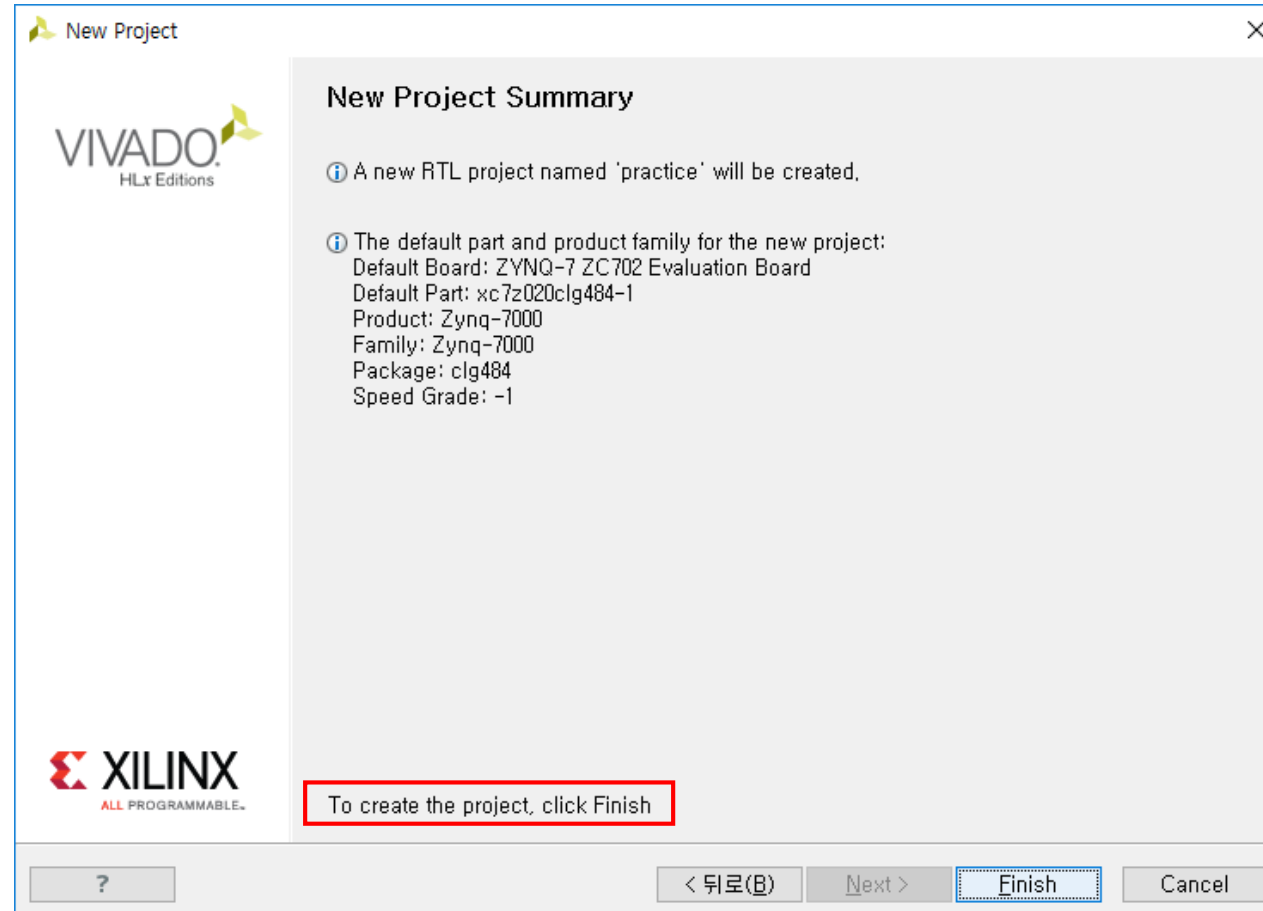
Choose RTL Project



Choose Parts/Boards

- We don't use any boards in this course, so just ignore this part and press next.

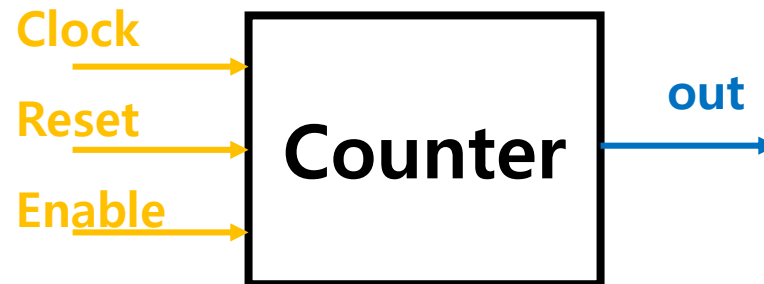
3. Create a new project



Simple Verilog Tutorial using Vivado

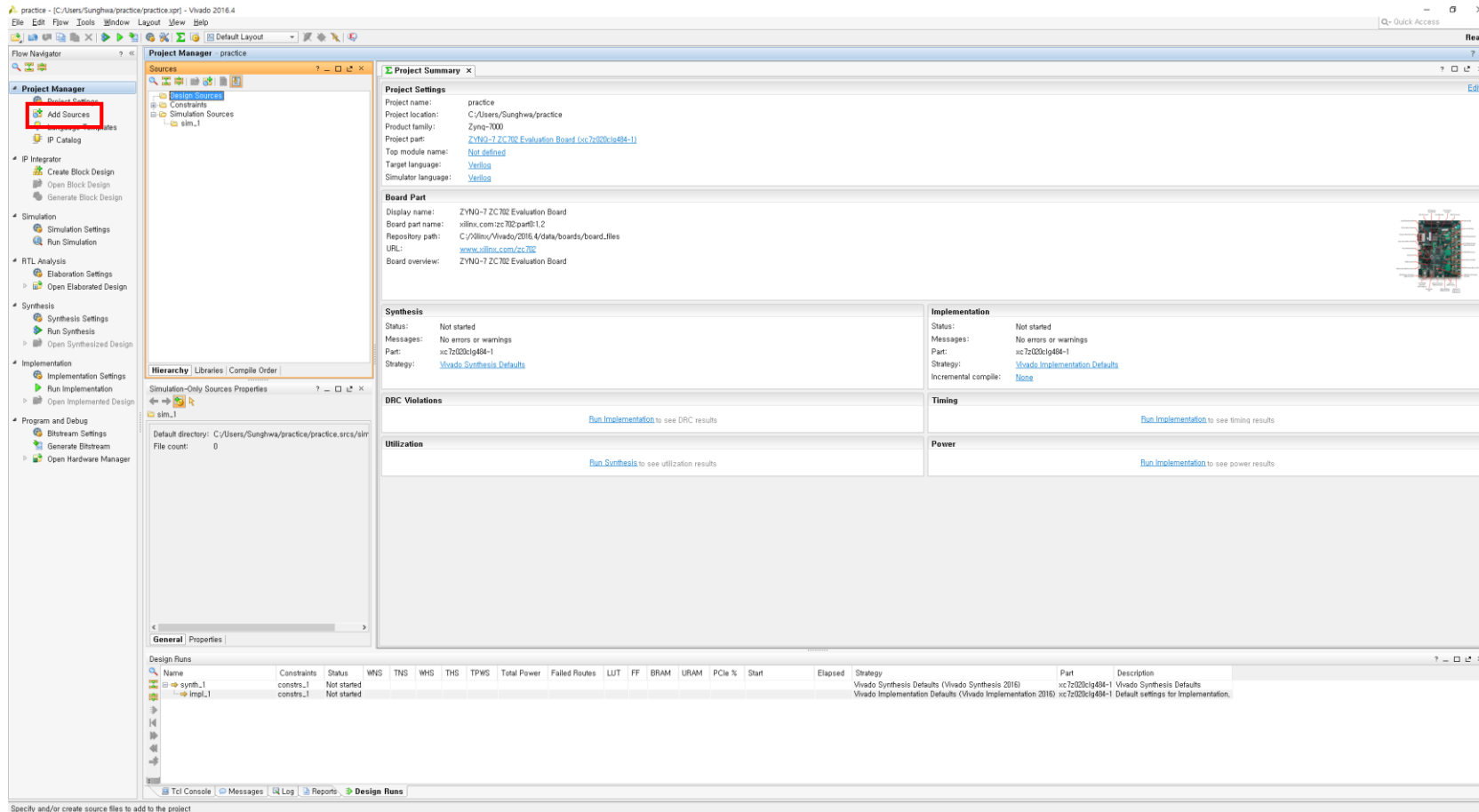
Counter

- 4-bit synchronous up-counter
- That is, the counter is incremented when the clock signal is positive edge.

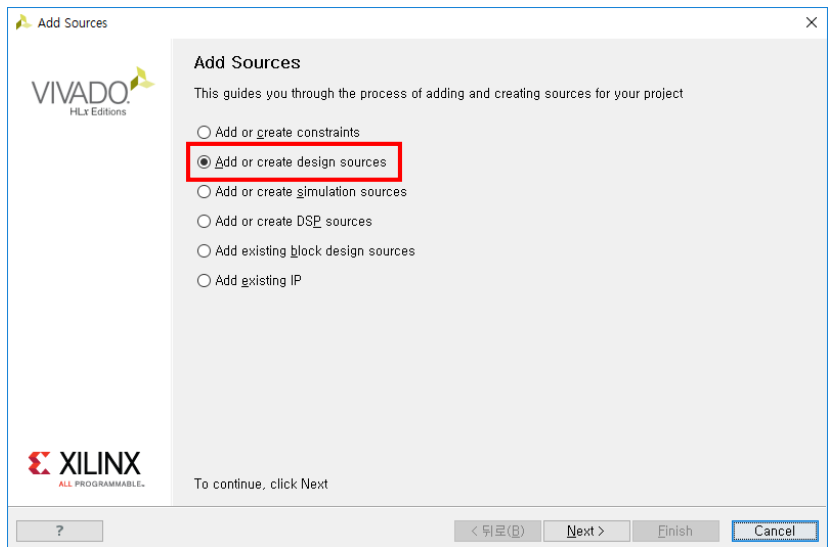


1. Add Design Sources

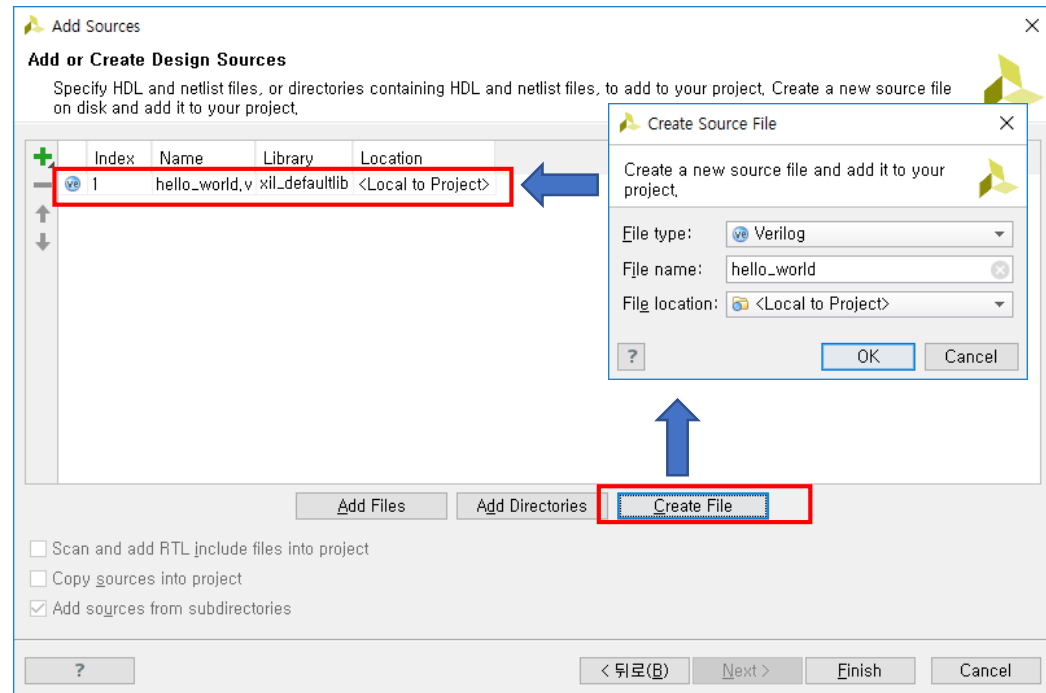
Click
Add Sources



2. Add Design Sources



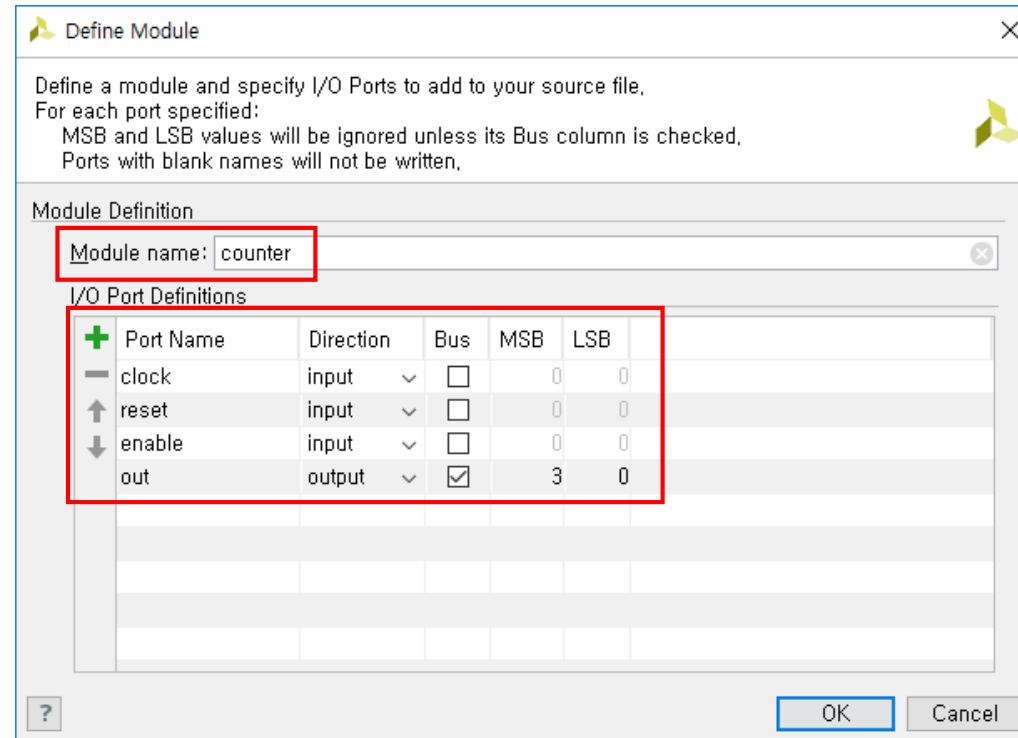
To continue, click Next



1. Click Create File
2. Enter file name ("hello_world")
3. Click Finish

3. Add Design Sources

- Change module name and enter I/O Port Definitions



The dialog box is titled "Define Module" and contains instructions: "Define a module and specify I/O Ports to add to your source file. For each port specified: MSB and LSB values will be ignored unless its Bus column is checked. Ports with blank names will not be written." Below the instructions is a "Module Definition" section with a text field for "Module name" containing the word "counter". Below that is an "I/O Port Definitions" section containing a table with 6 columns: Port Name, Direction, Bus, MSB, and LSB. The table has 5 rows. The first row is a header with a green plus icon. The second row is "clock" with direction "input", "Bus" unchecked, MSB "0", and LSB "0". The third row is "reset" with direction "input", "Bus" unchecked, MSB "0", and LSB "0". The fourth row is "enable" with direction "input", "Bus" unchecked, MSB "0", and LSB "0". The fifth row is "out" with direction "output", "Bus" checked, MSB "3", and LSB "0". The "out" row is highlighted. At the bottom are buttons for "?", "OK", and "Cancel".

Define Module

Define a module and specify I/O Ports to add to your source file.
For each port specified:
MSB and LSB values will be ignored unless its Bus column is checked.
Ports with blank names will not be written.

Module Definition

Module name: counter

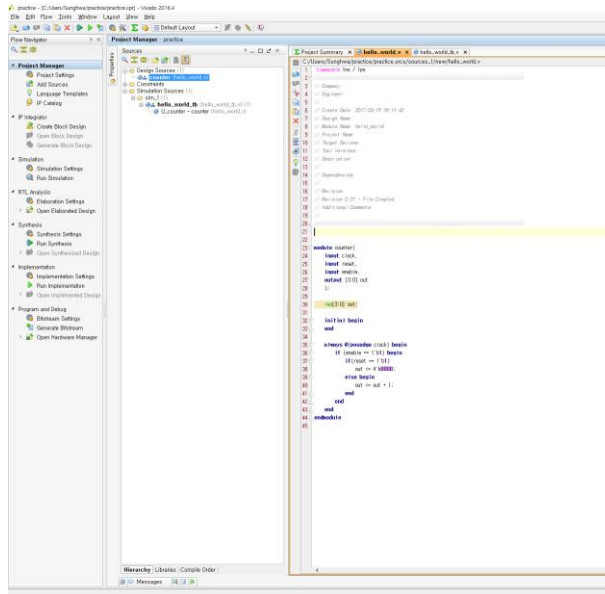
I/O Port Definitions

+	Port Name	Direction	Bus	MSB	LSB
-	clock	input	<input type="checkbox"/>	0	0
↑	reset	input	<input type="checkbox"/>	0	0
↓	enable	input	<input type="checkbox"/>	0	0
	out	output	<input checked="" type="checkbox"/>	3	0

? OK Cancel

4. Write code

(* Copy this code and paste it *)



```
`timescale 1ns / 100ps
```

```
module counter (input clock, input reset, input enable, output [3:0] out);  
    reg [3:0] out;
```

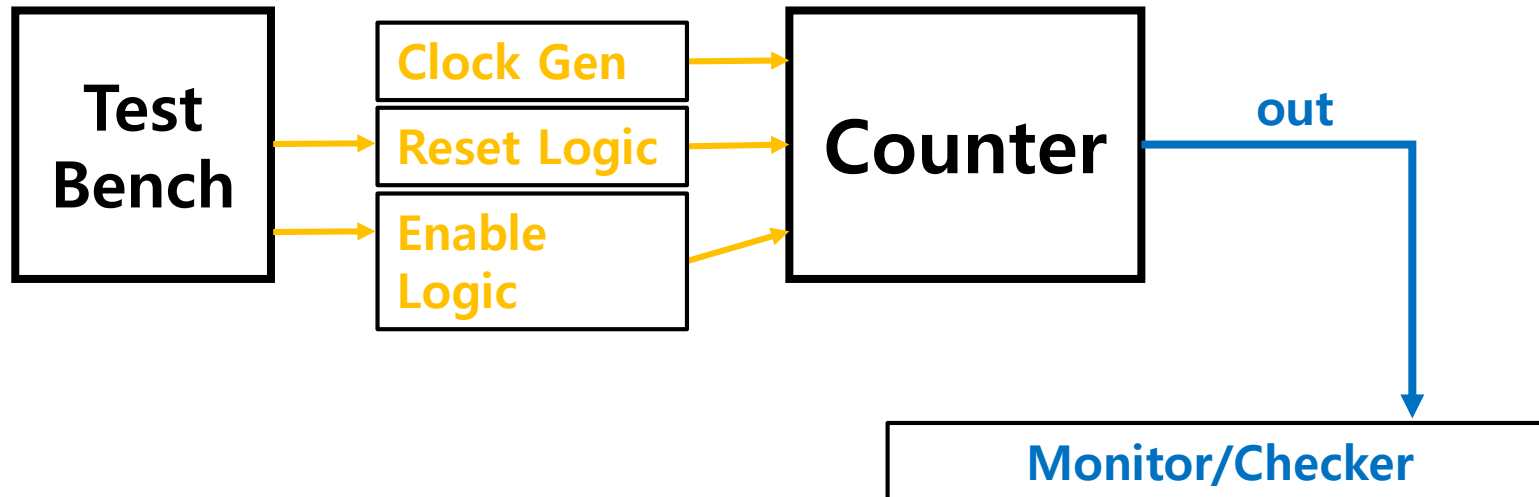
```
    initial begin  
    end
```

```
    always @(posedge clock) begin  
        if (enable == 1'b1) begin  
            if (reset == 1'b1)  
                out <= 4'b0000;  
            else begin  
                out <= out+1;  
            end  
        end  
    end
```

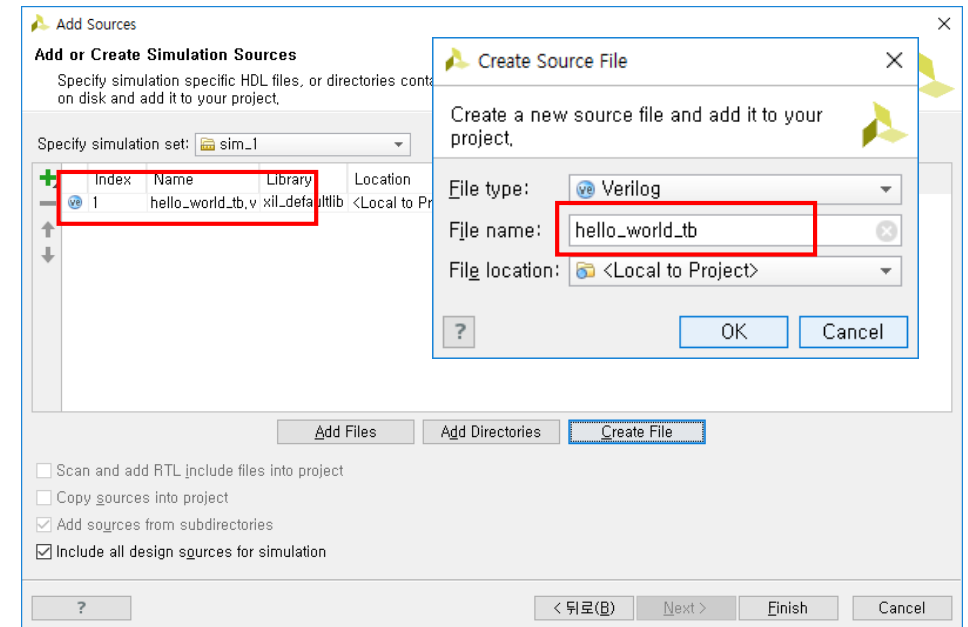
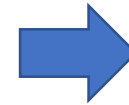
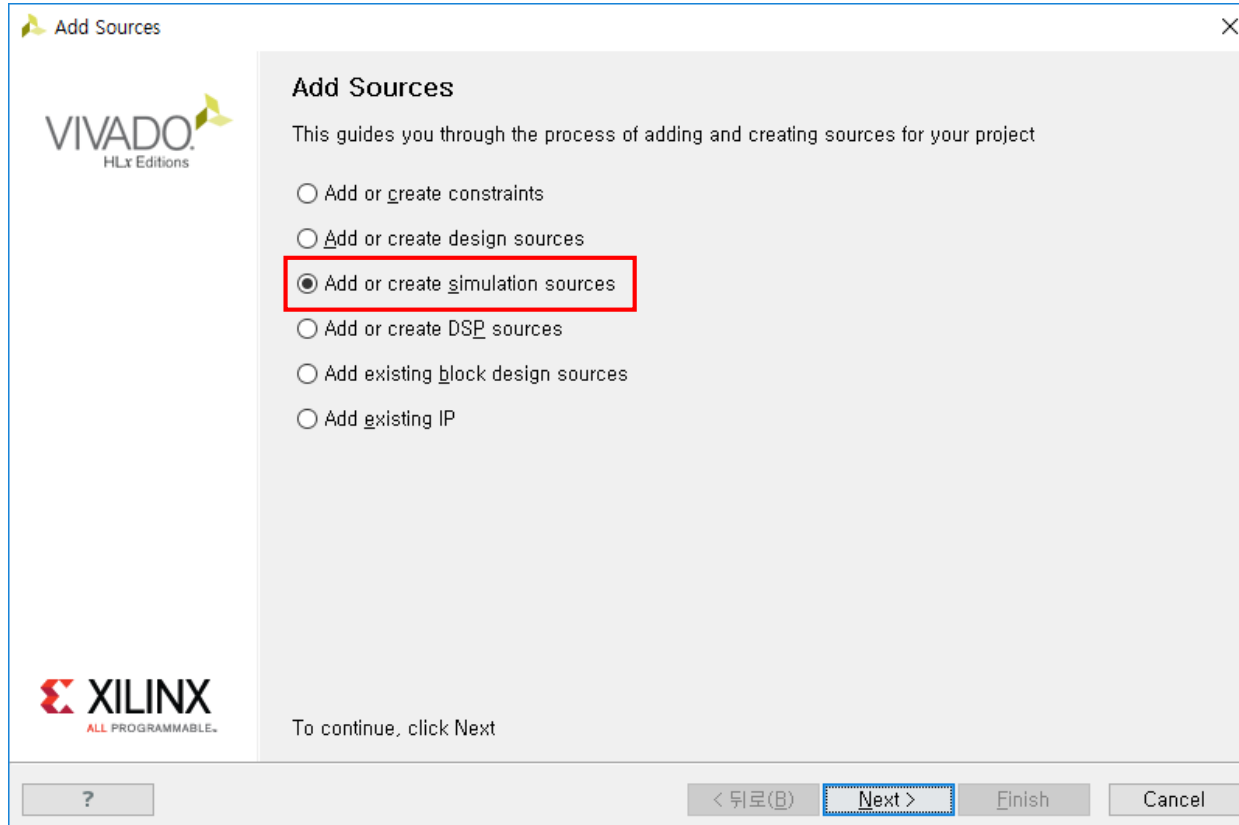
```
end  
endmodule
```

5. Write down your testbench

- To test the counter, a testbench file is needed.

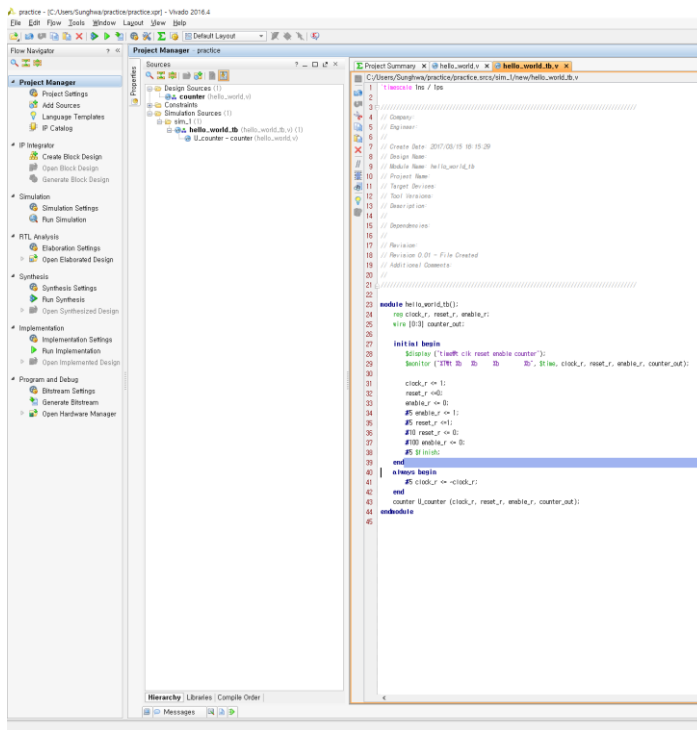


6. Add a testbench sources Clock "Add Sources"



7. Write code

(* Copy this code and paste it *)



```
module hello_world_tb();
    reg clock_r, reset_r, enable_r;
    wire [3:0] counter_out;

    initial begin
        $display ("time\t clk reset enable counter");
        $monitor ("%T\t %b %b %b %b", $time, clock_r,
reset_r, enable_r, counter_out);

        clock_r <= 1;
        reset_r <= 0;
        enable_r <= 0;
        #5 enable_r <= 1;
        #5 reset_r <= 1;
        #10 reset_r <= 0;
        #100 enable_r <= 0;
        #5 $finish;

    end

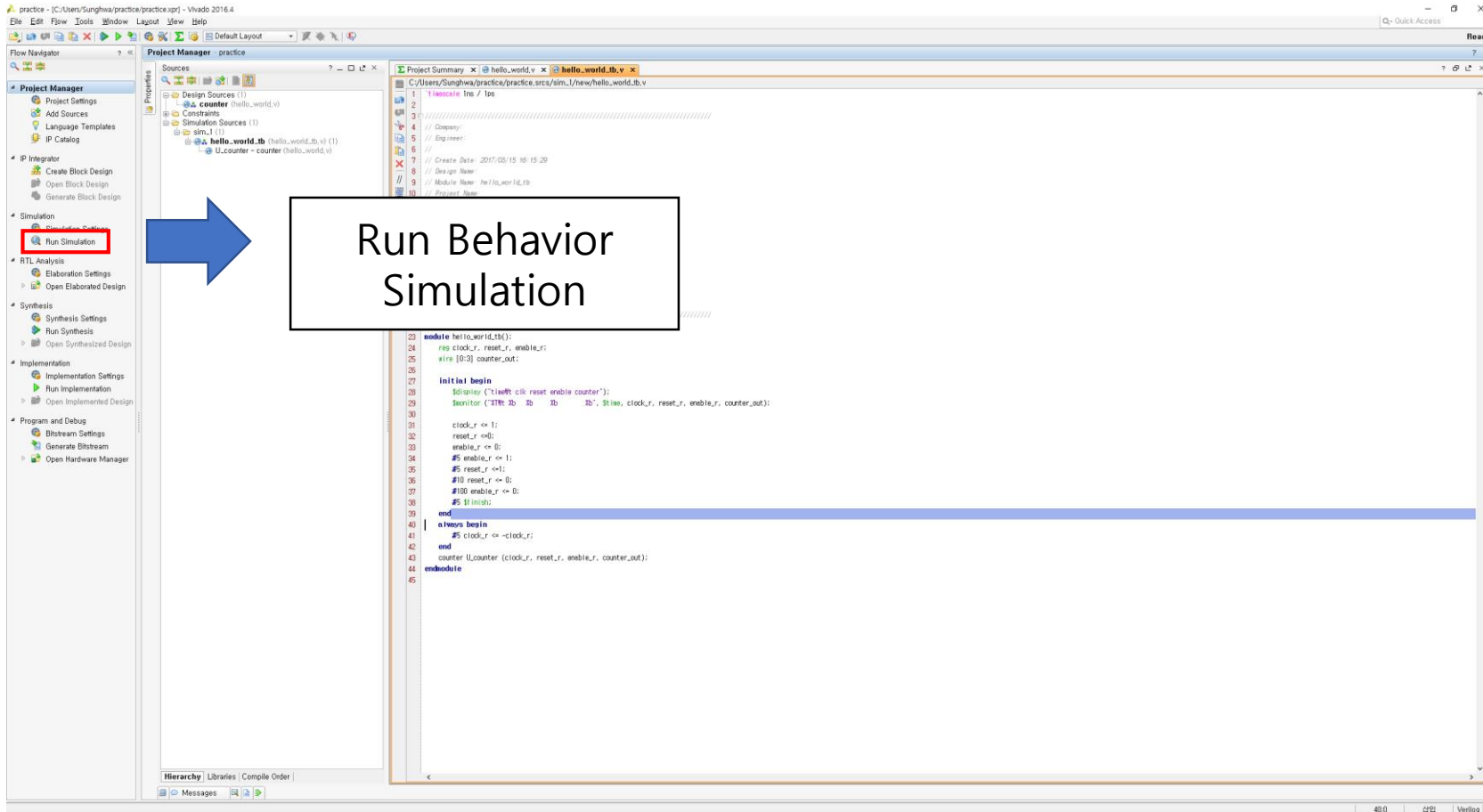
    always begin
        #5 clock_r <= ~clock_r;

    end

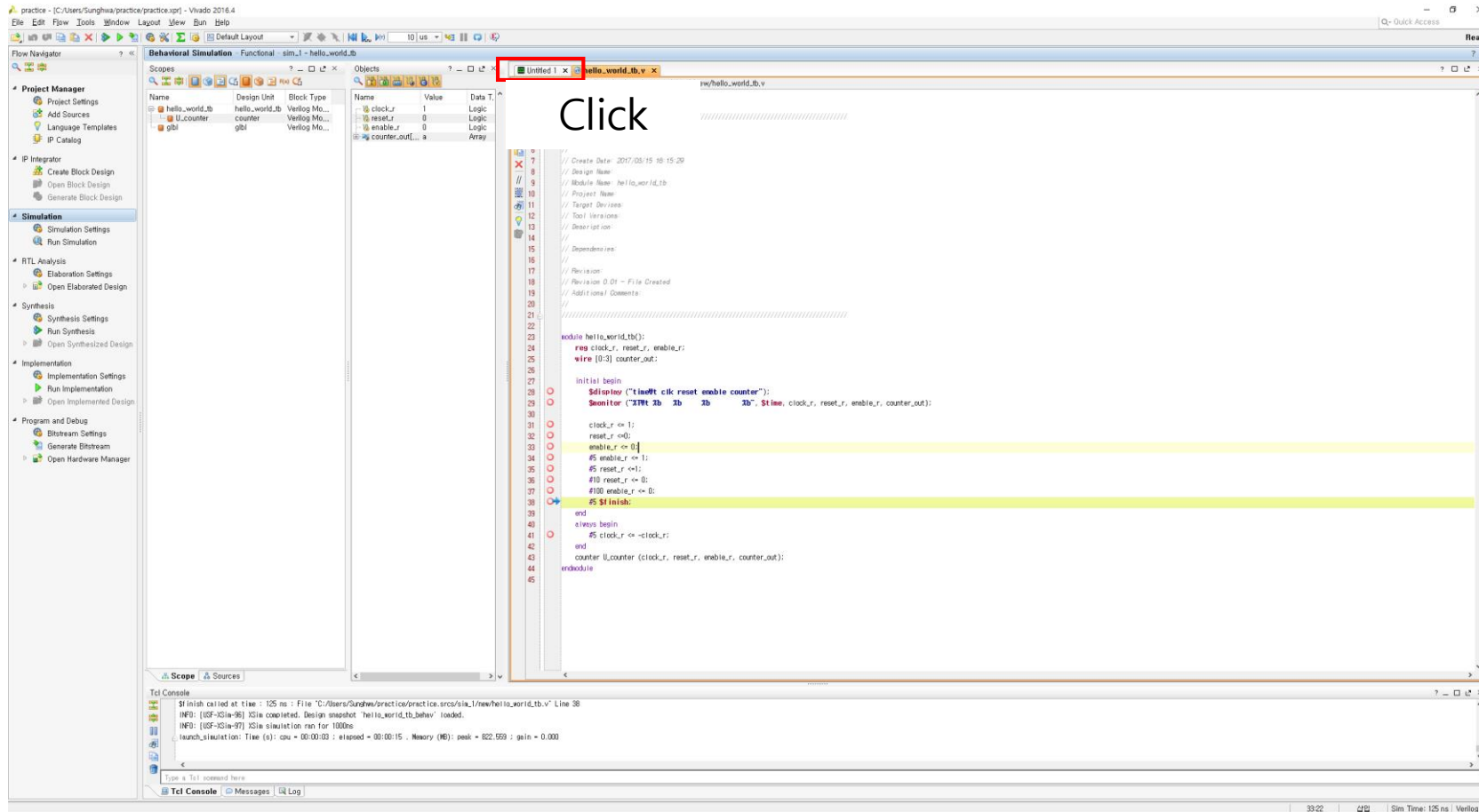
    counter U_counter (clock_r, reset_r, enable_r, counter_out);

endmodule
```


8. Run Simulation!



9. Run simulation



10. Check the result

